STORM WATER MANAGEMENT PLAN

ONE EAST PLEASANT STREET

AMHERST, MA

AUGUST 6, 2014
REVISED: OCTOBER 22, 2014

PREPARED FOR:
Archipelago Investments, LLC
37 South Pleasant Street
Amherst, MA 01002

PREPARED BY:
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SVE Project No: G1821

COMMONWEALTH OF MASSACHUSETTS
ANTHONY WONSESKI JR.
CIVIL
No. 46615
REGISTERED
PROFESSIONAL ENGINEER

Anthony Wonseski Jr., P.E.	10.22.14
RCE NO. 46615	Date

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1.0 Introduction

This Storm Water Management Plan (SWMP) documents drainage impacts associated with the proposed redevelopment at One East Pleasant Street; Amherst, MA. The property is approximately 35,375 square feet in size and is located at East Pleasant Street and North Pleasant Street. The property is currently a commercial/retail use and is known as the Amherst Carriage Shops. The proposed multi-use redevelopment consists of commercial space at ground level with upper floor residential.

Refer to the vicinity map on page 4 for the specific location of the project.

2.0 Existing Conditions

2.1 Site Characteristics

The site is an active commercial/retail development. The surrounding area consists of a parking area to the North; West Cemetery to the East, and commercial building and parking to the South. Storm water runoff from the property collects in two catch basins within the parking area and conveys runoff via underground pipe the Amherst Municipal Storm drainage system located in East Pleasant Street.

Refer to page 5 for an aerial plan of the existing property.

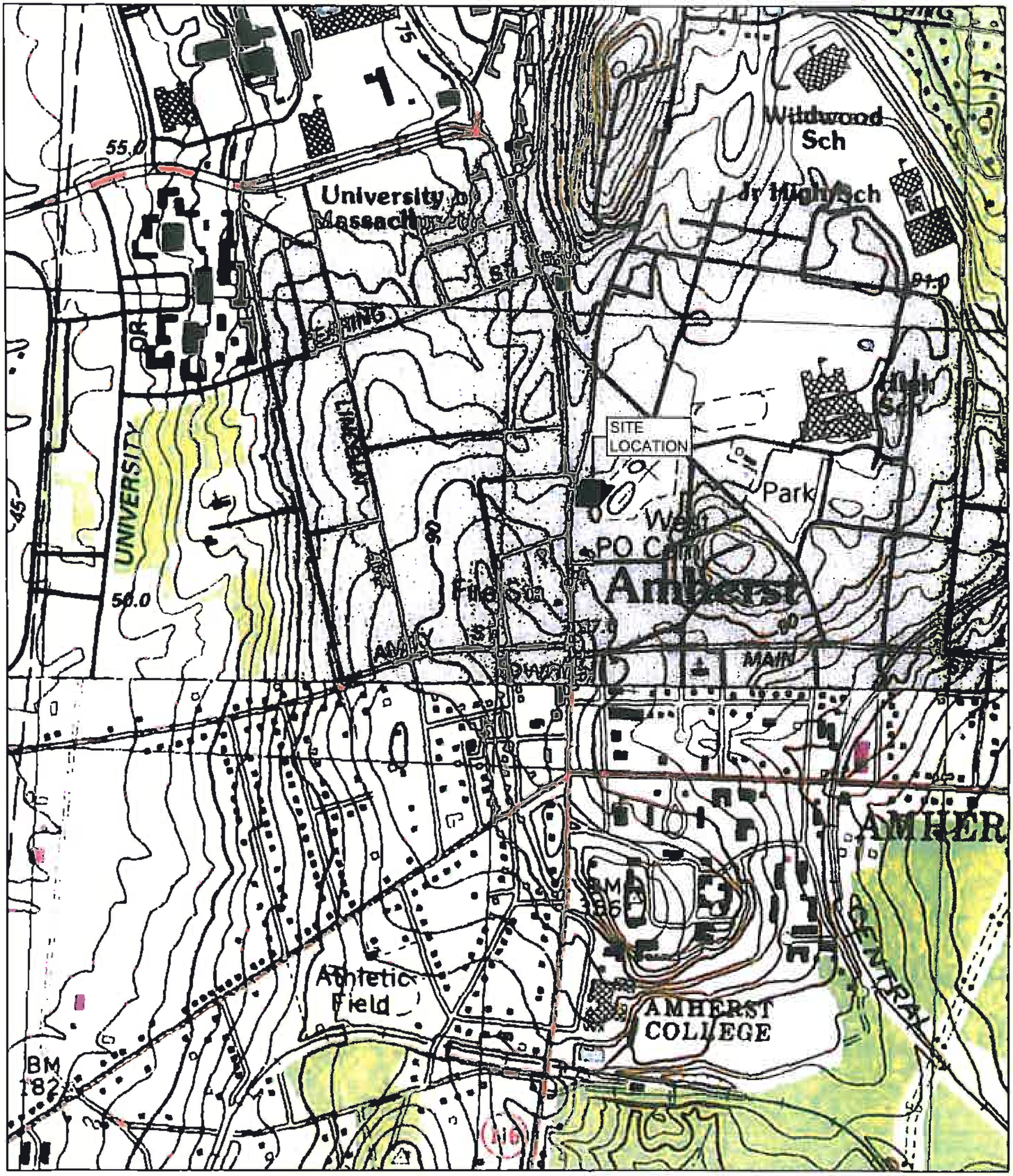
2.2 Soil Characteristics

Review of the Natural Resources Conservation Service Web Soil Survey indicates the project area is primarily Hinckley-Merrimac Urban Land Complex. These soils are classified as A Soils. Refer to page 6 for a copy of the soils map.

2.3 Floodplain

Review of the Flood Insurance Rate Map (FIRM) for the Town of Amherst, Massachusetts, Community Panel Number 250156 - 0005 C, effective date: December 15, 1983, indicates the subject property falls within zone C:Areas of minimal flooding.

Refer to page 7 for a copy of the Flood Insurance Rate Map (FIRM).



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USGS VICINITY MAP

GRAPHIC SCALE: 1" = 1000'
0 500 1000

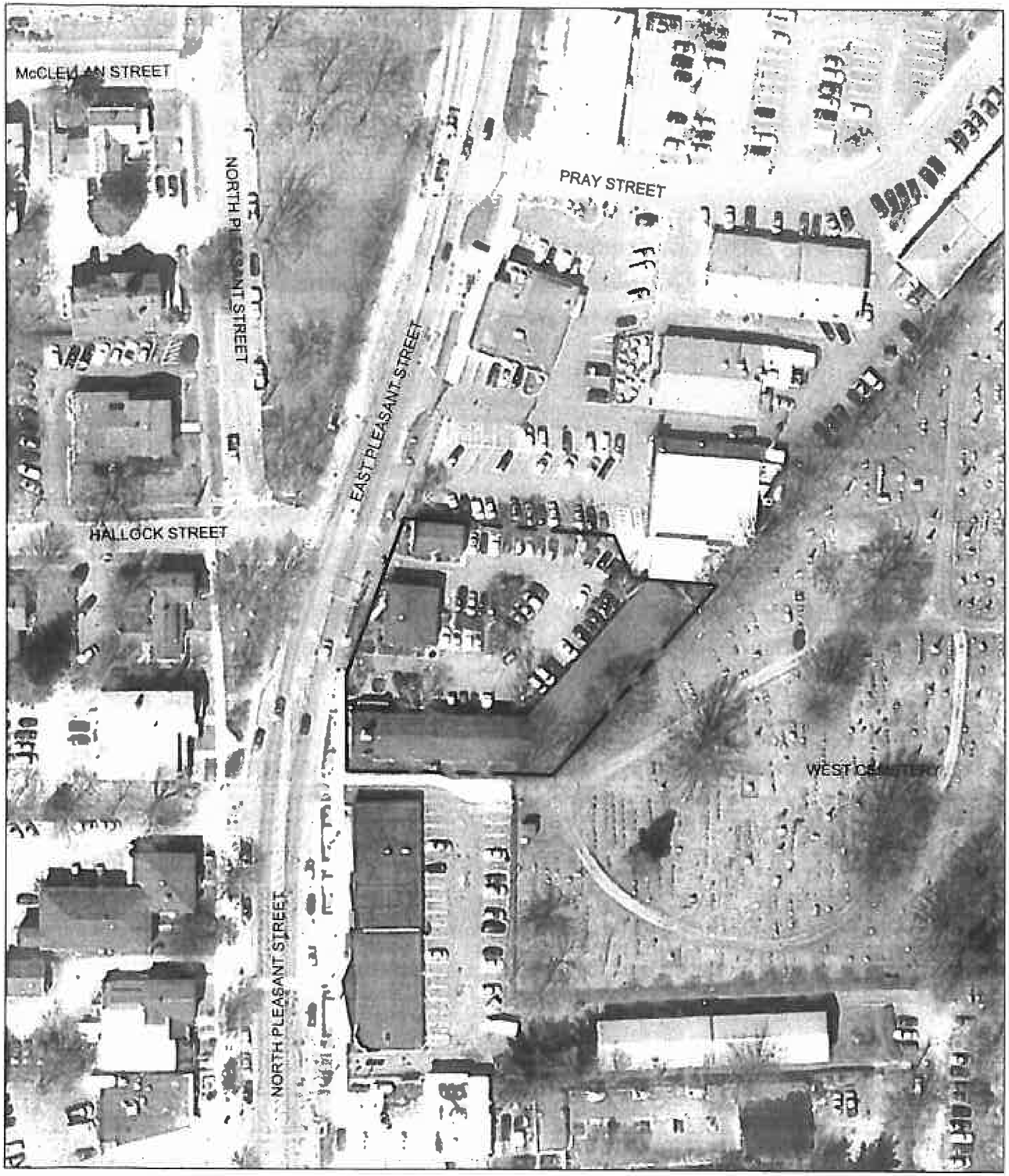
N

PROJ # G1821

DATE 07-AUG-14

SHEET 4

Drawing name P:\Project\G1821 Archipelago Investments, LLC\Docs\Reports\VICINITY MAP & AERIAL.dwg Aug 07, 2014 - 3:22pm



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EXISTING AERIAL SITE MAP

0 50 100
GRAPHIC SCALE: 1" = 100'

PROJ #: G1821

DATE: 07-AUG-14

SHEET 5

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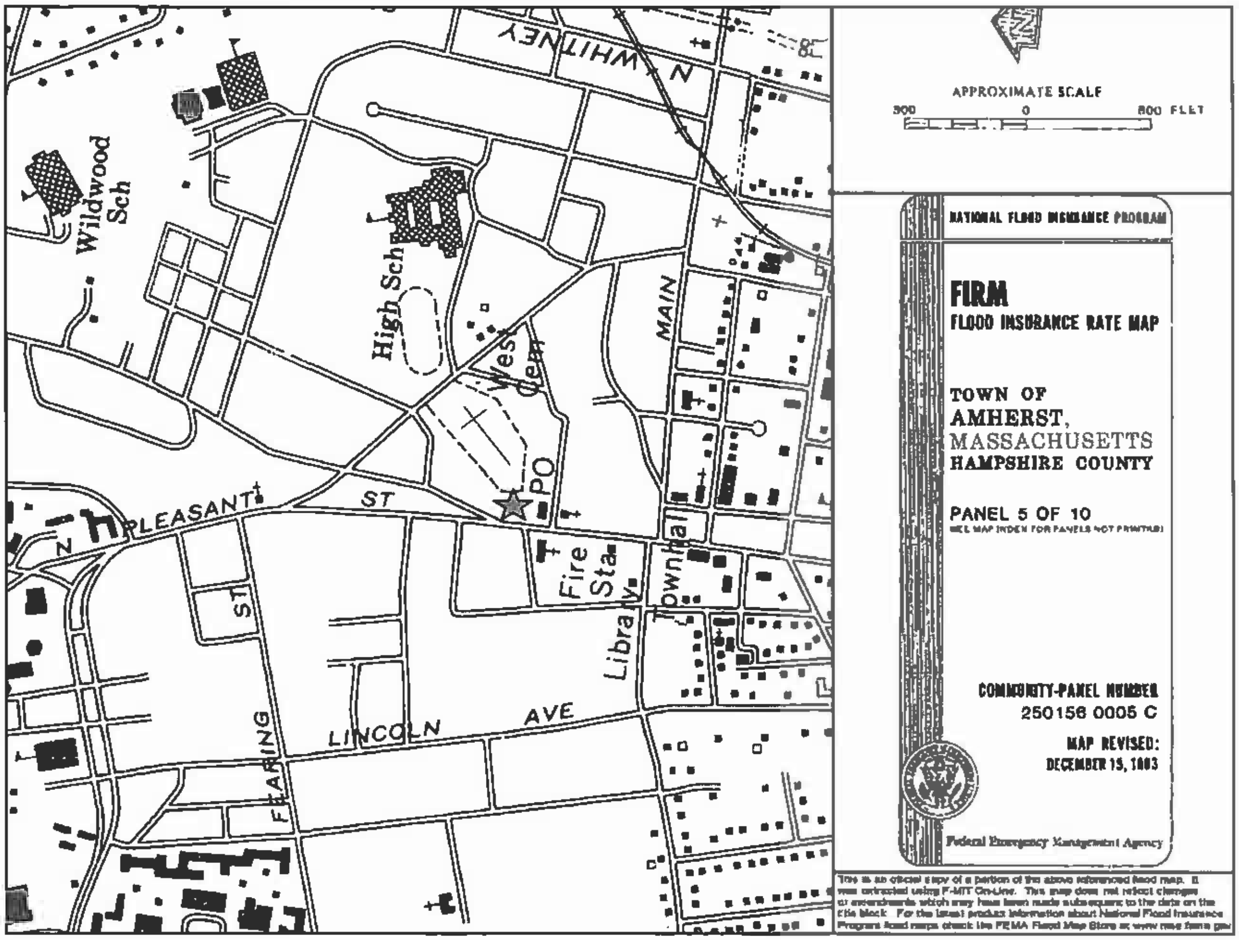
SOIL MAP


Custom Soil Resource Report
Soil Map
E Pleasant St
Pleasant St
N

FLOOD INSURANCE RATE MAP



2.4 Existing Hydrology

The drainage area studied for this project is approximately 35,375 square feet in size. Hydrological calculations indicate the expected runoff generated from the existing commercial property. The generated runoff drains to onsite catch basins. The catch basins connect to the municipal storm system located in East Pleasant Street.

Refer to Pocket #1 for the existing conditions hydrology exhibit to designate areas used for the analysis.

The table below summarizes the results of the existing runoff calculations for the property. Flow is represented in cubic feet per second (CFS).

Design Storm	Existing Runoff
Q2	1.49
Q10	2.76
Q100	4.41

Note:

Existing condition runoff accounts for runoff expected to be generated from the site as it is today.

Refer to Appendix A for hydrology calculations.

3.0 Developed Conditions

3.1 Design Objectives

The objective of this SWMP is to analyze the pre and post development storm water runoff conditions and impacts to downstream properties for the proposed building development. The Amherst DPW has expressed concerns about the existing watershed during previous discussions. This watershed has experienced flooding from past large storm events. In order to mitigate a potential increase in runoff from this redevelopment the design will include Low Impact Development (LID) design measures. The project will install a two sections of green roof in the open parking area, Landscape planters, and porous pavers in the woonerf alley. The redevelopment runoff will be reduced slightly as a result of these measures.

3.2 Developed Hydrology

Refer to Appendix A for Hydrology Calculations.

Refer to Pocket #2 for Redeveloped Hydrology Maps

3.3 Summary of Post Development Hydrology

Design Storm	Existing	Redeveloped	Δ
Q2	1.49	1.42	**-0.07**
Q10	2.76	2.68	**-0.08**
Q100	4.41	4.33	**-0.08**

4.0 Conclusion

This Storm Water Management Plan has been prepared to document the storm water impacts associated with the redevelopment of One East Pleasant Street. Analysis was performed for the 2, 10 and 100 year design storms. The analysis shows that through careful site design of the project, the proposed redevelopment will not adversely affect existing downstream utilities or properties. The proposed storm drain facilities will improve expected runoff conditions utilizing LID design principles and implementing a sections of green roof and porous pavers.

Standard No. 1 – There are no new storm water conveyances (e.g. outfalls) discharging untreated storm water directly to or cause erosion in wetlands or waters of the Commonwealth. On-site storm water from impervious areas will drain to an existing municipal storm drain facilities. On-site deep sump hooded catch basins, green roof, porous pavers, and vortsentry hydrodynamic separation will be installed.

Standard No. 2 –Redevelopment project results in no increase in peak discharges from the proposed redevelopment for the 2, 10 and 100 year design storms.

Standard No. 3 – Review of the Web Soils Survey indicates the surface soil at the site is of a hydrologic classification of A. Actual soil evaluation has not been performed at this time. Soils reports shall be reviewed to confirm assumptions related to the design of the storm drain systems are and remain valid.

Standard No. 4 – TSS removal requirements will be improved for this redevelopment project due to the installation of a green roof and the installation of a deep sump hooded catch basins and vortsentry system.

Standard No. 5 – Not applicable.

Standard No. 6 – Not Applicable. The property is not within a Zone II or interim Wetland Protection Area of a public water supply or a watershed protection overlay zone.

Standard No. 7 – Redevelopment project meets standards to maximum extent practicable under state and town regulations.

Standard No. 8 – A plan to control construction related sediment is provided. Refer to project plans.

Standard No. 9 –Refer to Appendix C for Operation and Maintenance of the proposed storm water drainage system.

Standard No. 10 – There is no known illicit discharges to the storm water management system.

Routing Diagram for G1821 One East Pleasant porous **pavement**
Prepared by {enter your company name here}, Printed 10/22/2014
HydroCAD® 10.00-13 s/n 04481 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.195	39	>75% Grass cover, Good, HSG A (1S)
0.617	98	Paved parking and roofs, HSG A (1S)
0.149	39	green roof and plantings (2S)
0.055	39	porous pavement (2S)
0.608	98	roof and impervious (2S)
1.624	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.812	HSG A	1S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.812	Other	2S
1.624		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.195	0.000	0.000	0.000	0.000	0.195	>75% Grass cover, Good	1S
0.617	0.000	0.000	0.000	0.000	0.617	Paved parking and roofs	1S
0.000	0.000	0.000	0.000	0.149	0.149	green roof and plantings	2S
0.000	0.000	0.000	0.000	0.055	0.055	porous pavement	2S
0.000	0.000	0.000	0.000	0.608	0.608	roof and impervious	2S
0.812	**0.000**	**0.000**	**0.000**	**0.812**	**1.624**	**TOTAL AREA**	

Time span=0.00-32.00 hrs, dt=0.02 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Conditions Runoff Area=35,375 sf 75.94% Impervious Runoff Depth=1.52"
Tc=5.0 min CN=84 Runoff=1.49 cfs 0.103 af

Subcatchment 2S: developed conditions Runoff Area=35,375 sf 74.91% Impervious Runoff Depth=1.45"
Tc=5.0 min CN=83 Runoff=1.42 cfs 0.098 af

Total Runoff Area = 1.624 ac Runoff Volume = 0.201 af Average Runoff Depth = 1.48"
24.57% Pervious = 0.399 ac 75.43% Impervious = 1.225 ac

Summary for Subcatchment 1S: Existing Conditions

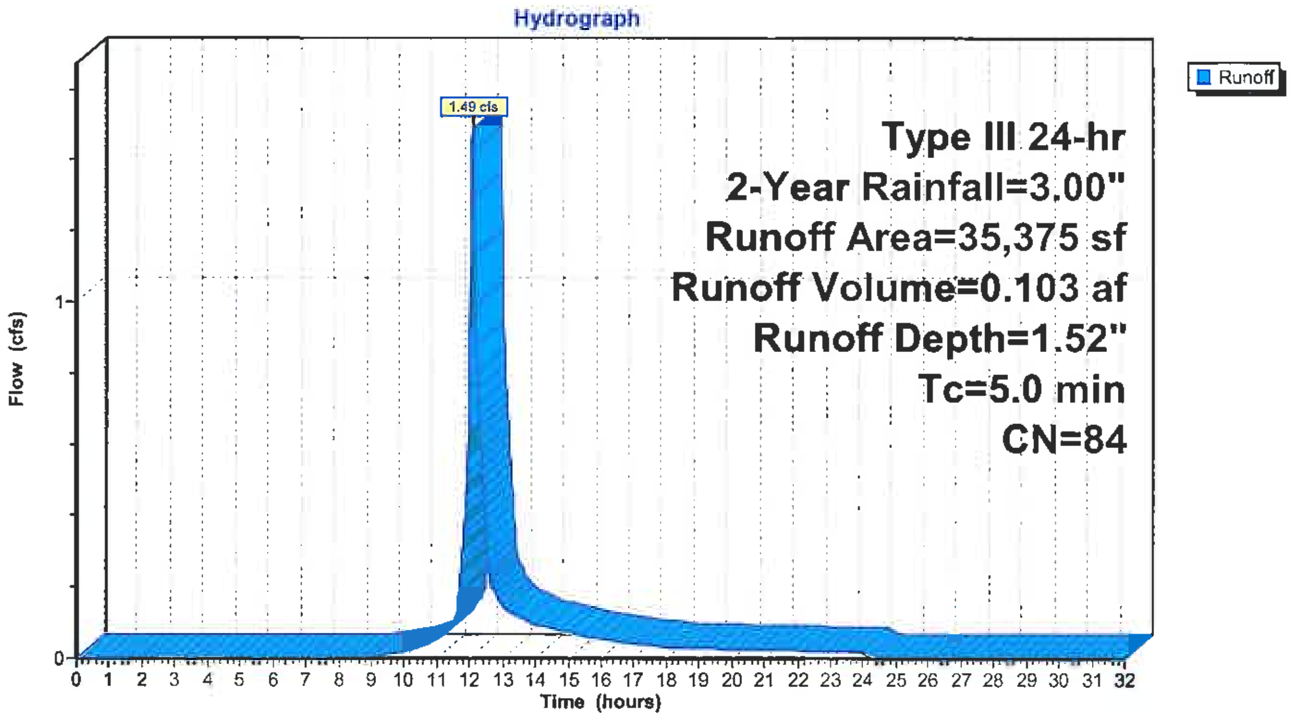
Runoff = 1.49 cfs @ 12.08 hrs, Volume= 0.103 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.00"

	Area (sf)	CN	Description
	8,512	39	>75% Grass cover, Good, HSG A
*	26,863	98	Paved parking and roofs, HSG A
	35,375	84	Weighted Average
	8,512		24.06% Pervious Area
	26,863		75.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 2S: developed conditions

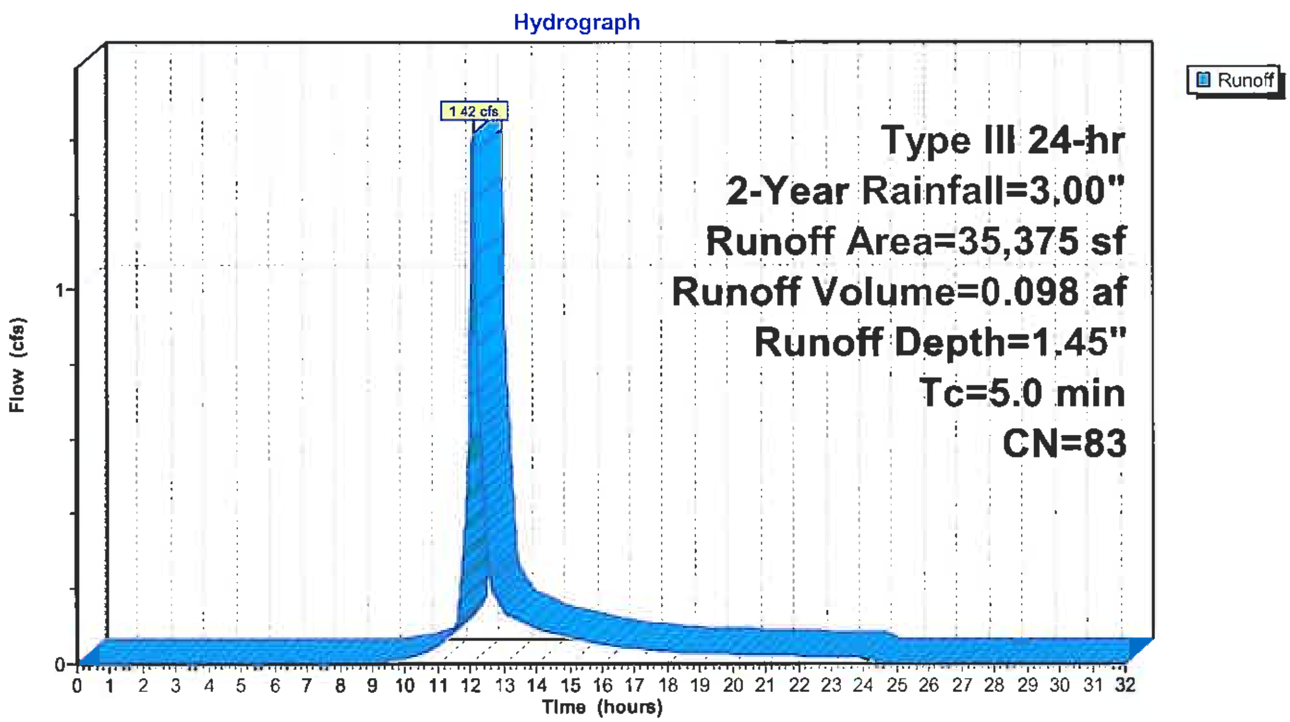
Runoff = 1.42 cfs @ 12.08 hrs, Volume= 0.098 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.00"

	Area (sf)	CN	Description
*	6,474	39	green roof and plantings
*	26,501	98	roof and impervious
*	2,400	39	porous pavement
	35,375	83	Weighted Average
	8,874		25.09% Pervious Area
	26,501		74.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: developed conditions



Time span=0.00-32.00 hrs, dt=0.02 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Conditions Runoff Area=35,375 sf 75.94% Impervious Runoff Depth=2.82"
Tc=5.0 min CN=84 Runoff=2.76 cfs 0.191 af

Subcatchment 2S: developed conditions Runoff Area=35,375 sf 74.91% Impervious Runoff Depth=2.73"
Tc=5.0 min CN=83 Runoff=2.68 cfs 0.184 af

Total Runoff Area = 1.624 ac Runoff Volume = 0.375 af Average Runoff Depth = 2.77"
24.57% Pervious = 0.399 ac 75.43% Impervious = 1.225 ac

Summary for Subcatchment 1S: Existing Conditions

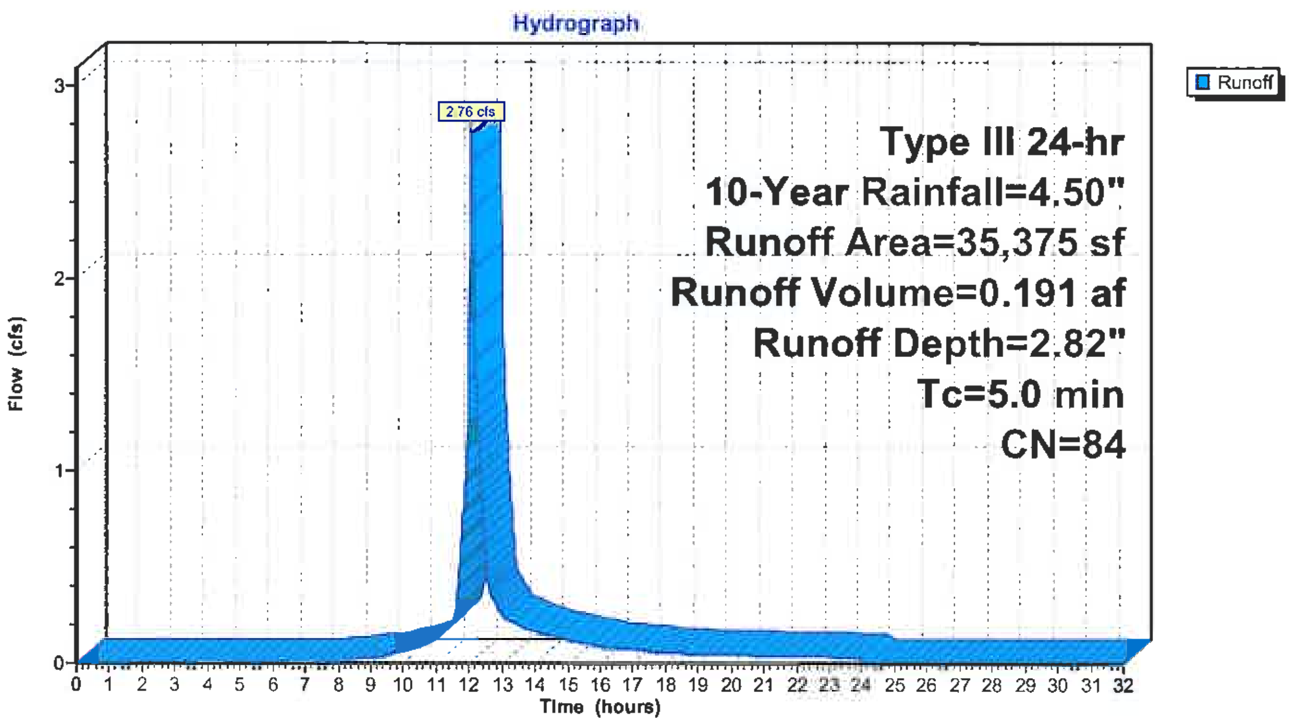
Runoff = 2.76 cfs @ 12.07 hrs, Volume= 0.191 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
	8,512	39	>75% Grass cover, Good, HSG A
*	26,863	98	Paved parking and roofs, HSG A
	35,375	84	Weighted Average
	8,512		24.06% Pervious Area
	26,863		75.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 2S: developed conditions

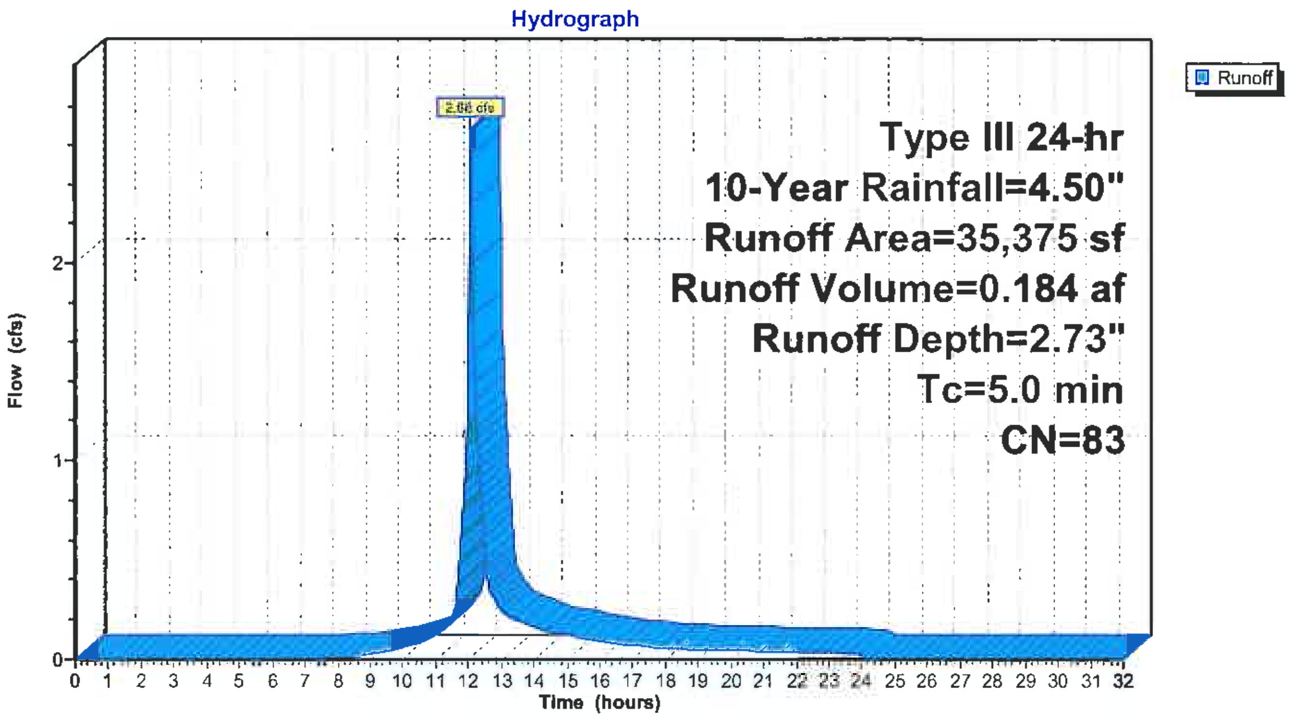
Runoff = 2.68 cfs @ 12.07 hrs, Volume= 0.184 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	6,474	39	green roof and plantings
*	26,501	98	roof and impervious
*	2,400	39	porous pavement
	35,375	83	Weighted Average
	8,874		25.09% Pervious Area
	26,501		74.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: developed conditions



Time span=0.00-32.00 hrs, dt=0.02 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Conditions Runoff Area=35,375 sf 75.94% Impervious Runoff Depth=4.57"
Tc=5.0 min CN=84 Runoff=4.41 cfs 0.309 af

Subcatchment 2S: developed conditions Runoff Area=35,375 sf 74.91% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=83 Runoff=4.33 cfs 0.302 af

Total Runoff Area = 1.624 ac Runoff Volume = 0.612 af Average Runoff Depth = 4.52"
24.57% Pervious = 0.399 ac 75.43% Impervious = 1.225 ac

Summary for Subcatchment 1S: Existing Conditions

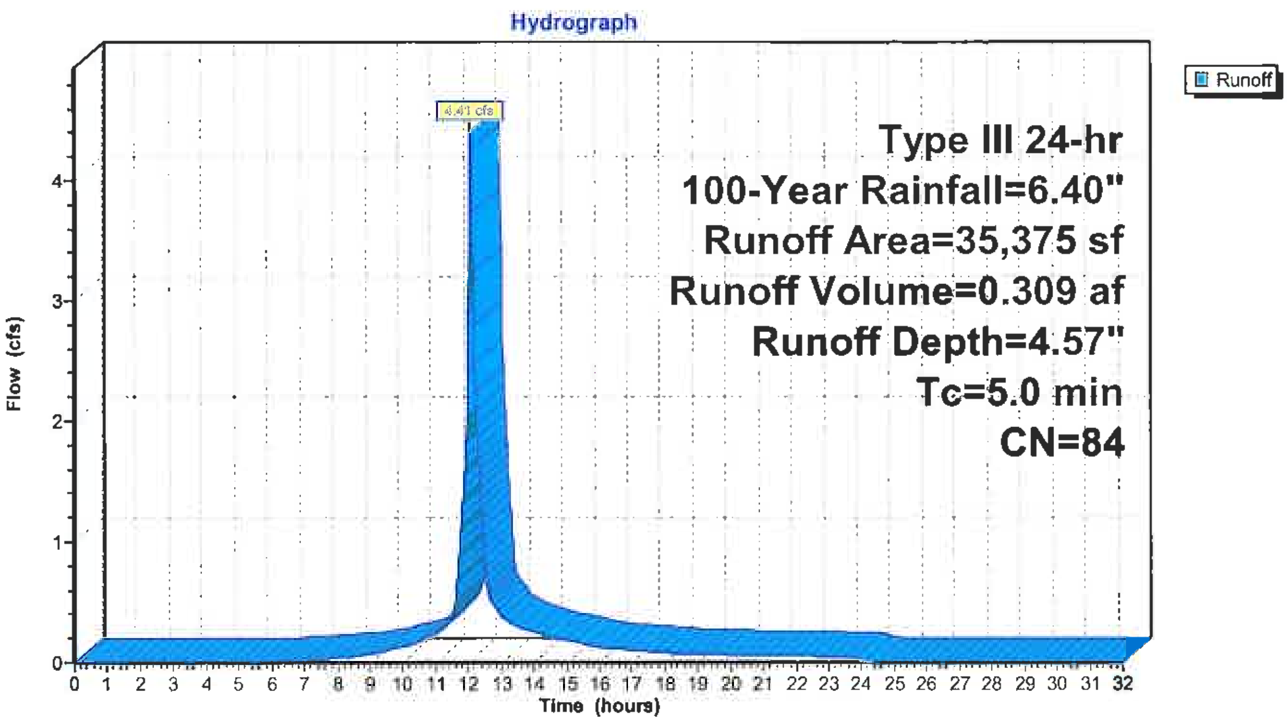
Runoff = 4.41 cfs @ 12.07 hrs, Volume= 0.309 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.40"

	Area (sf)	CN	Description
	8,512	39	>75% Grass cover, Good, HSG A
*	26,863	98	Paved parking and roofs, HSG A
	35,375	84	Weighted Average
	8,512		24.06% Pervious Area
	26,863		75.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 2S: developed conditions

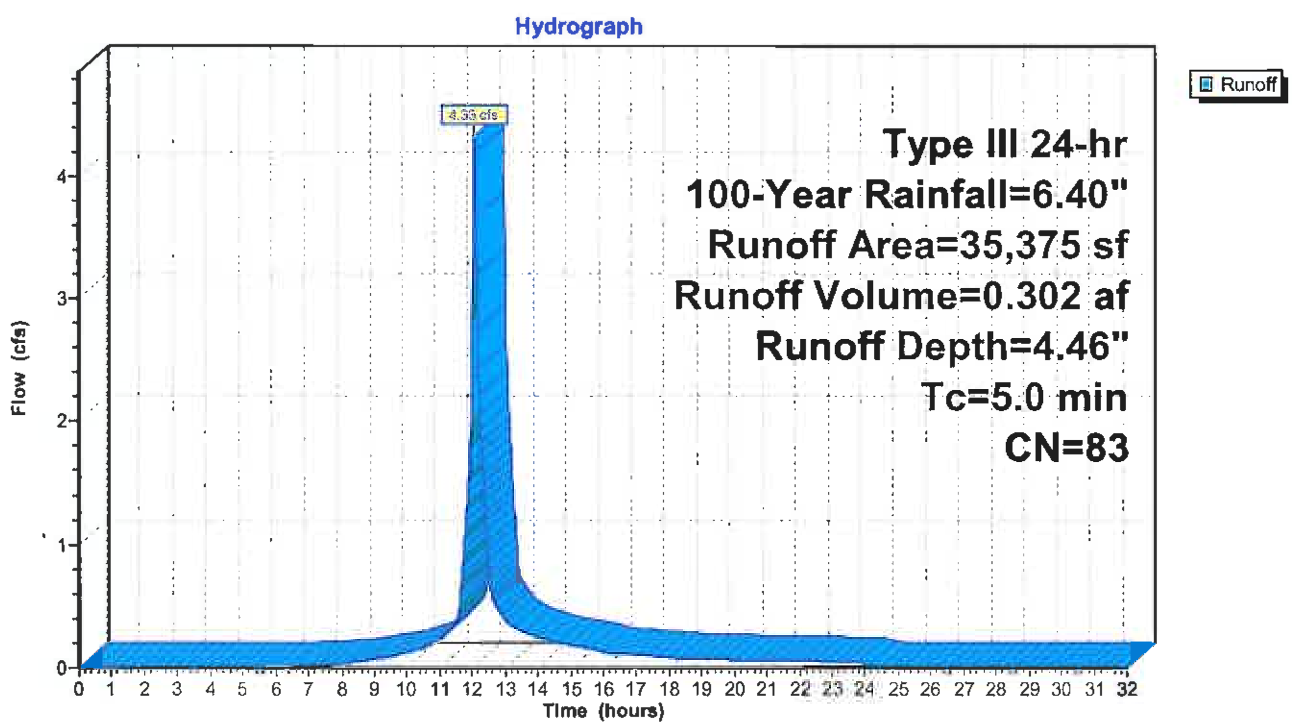
Runoff = 4.33 cfs @ 12.07 hrs, Volume= 0.302 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-32.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.40"

	Area (sf)	CN	Description
*	6,474	39	green roof and plantings
*	26,501	98	roof and impervious
*	2,400	39	porous pavement
	35,375	83	Weighted Average
	8,874		25.09% Pervious Area
	26,501		74.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: developed conditions



USDA United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Hampshire County, Massachusetts, Central Part

August 7, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:1,240 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 8, Dec 17, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 28, 2011—May 12, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Hampshire County, Massachusetts, Central Part (MA609)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
745C	Hinckley-Merrimac-Urban land complex, 3 to 15 percent slopes	7.0	100.0%
Totals for Area of Interest		**7.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Hampshire County, Massachusetts, Central Part

745C—Hinckley-Merrimac-Urban land complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9b0c
Elevation: 0 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 30 percent
Urban land: 25 percent
Merrimac and similar soils: 25 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loose sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 8 inches: loamy sand
H2 - 8 to 13 inches: loamy sand
H3 - 13 to 29 inches: gravelly sand
H4 - 29 to 60 inches: Error

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A

Description of Merrimac

Setting

Landform: Outwash plains

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from granite and gneiss

Typical profile

H1 - 0 to 16 inches: gravelly fine sandy loam
H2 - 16 to 24 inches: gravelly sandy loam
H3 - 24 to 60 inches: stratified sand to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A

Description of Urban Land

Setting

Parent material: Paved/fill

Minor Components

Agawam

Percent of map unit: 4 percent

Ninigret

Percent of map unit: 4 percent

Sudbury

Percent of map unit: 4 percent

Windsor

Percent of map unit: 4 percent

Walpole

Percent of map unit: 4 percent
Landform: Terraces

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ONE EAST PLEASANT STREET
AMHERSRT, MASSACHUSETTS

Storm Water Management Plan
Long-Term Operations & Maintenance Plan

OCTOBER 22, 2014

SVE PROJECT NO: G1821

Prepared for:

Archipelago Investments, LLC
37 South Pleasant Street
Amherst, MA 01002

Prepared By:
SVE Associates
377 Main Street
Greenfield, MA 01301
(413) 774-6698

Maintenance Activities- Inspections Performed by the Applicant.

1. **Porous Pavers**

Activity	Frequency
Monitor to ensure paving surface drains properly after storms.	As needed.
Add joint material to paving stones (sand) to replace material that has been transported.	As needed.
Inspect surface for deterioration	Annually
Assess exfiltration capability .	Annually

2. **Deep Sump Hooded Catch Basins**

Activity	Frequency
Inspect deep sump catch basins	Four times a year
Clean out collected sediment	Whenever the depth of sediment deposit is greater than or equal to one half the depth from the bottom of the sump to the lowest pipe in the basin.

3. **VortSentry HS**

Per Manufacturer's Requirements - See Attached.

Estimated Annual Maintenance Budget: **$4,500**

Storm Water Best Management Practices (BMP's) Inspection Report

Project Name: One East Pleasant Street, Amherst, MA

Date of Inspection: ____________________

Inspector's Name: ______________________

BMP	BMP Operating Properly		Remarks
	Yes	No	
1. Porous Pavers	☐	☐	
2. Deep Sump Hooded Catch Basins	☐	☐	
3. Vortsentry Unit	☐	☐	

Inspector Signature: ______________________ Date:____________

Best Management Practices for Good Housekeeping

Follow these BMPs to control pollutant discharges. The objectives are: 1) to keep pollutants from contacting rain, and 2) to keep pollutants from being dumped or poured into the storm drains. The goal is "only rain in the storm drain."

Activities	Best Management Practices
Pavement Cleaning	• Sweep parking lots and other paced areas periodically to remove debris. Dispose of debris in the garbage. Minimum twice per year
Litter Control	• Provide an adequate number of trash receptacles for your customers and employees. This helps keep trash from overflowing the receptacles. • Pickup litter and other wastes daily from outside areas including storm drain inlet gates
Waste Disposal*	• Inspect dumpsters and other waste containers periodically. Repair or replace leaky dumpsters and containers • Cover dumpsters and other waste containers. • Never dispose of waste products in storm drain inlets. • Recycle wastes or dispose properly
Material Storage.*	• Store materials such as grease, paints, detergents, metals, and raw materials in appropriate, labeled containers. • make sure all outdoor storage containers have lids, and that the lids are adequately closed. • Store stockpiled materials inside of building, under a roof, or covered with a tarp to prevent contact with rain.
Training	• Train employees regularly on good housekeeping practices. • Assign a person to be responsible for effective implementation of BMPs

* Hazardous materials must comply with hazardous materials storage and disposal requirements.

VortSentry® HS Maintenance

The VortSentry HS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly, but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment washdown areas and in climates where winter sanding operations may lead to rapid accumulations of a large volume of sediment. It is useful and often required as part of a permit to keep a record of each inspection. A simple inspection and maintenance log form for doing so is available for download at www.contechstormwater.com.

The VortSentry HS should be cleaned when the sediment has accumulated to a depth of two feet in the treatment chamber. This determination can be made by taking two measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the distance given in Table 1, the VortSentry HS should be maintained to ensure effective treatment.

Cleaning

Cleaning of the VortSentry HS should be done during dry weather conditions when no flow is entering the system. Cleanout of the VortSentry HS with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole cover and insert the vacuum hose into the sump. All pollutants can be removed from this one access point from the surface with no requirements for Confined Space Entry.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads, which solidify the oils. These are usually much easier to remove from the unit individually, and less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Floating trash can be netted out if you wish to separate it from the other pollutants.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. If anyone physically enters the unit, Confined Space Entry procedures need to be followed.

Disposal of all material removed from the VortSentry HS should be done is accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

VortSentry HS Model	Diameter		Distance Between Water Surface and Top of Storage Sump		Sediment Storage		Oil Spill Storage	
	in.	m	ft.	m	yd^3	m^3	gal.	liter
HS36	36	0.9	3.6	1.1	0.5	0.4	83	314
HS48	48	1.2	4.7	1.4	0.9	0.7	158	598
HS60	60	1.5	6.0	1.8	1.5	1.1	258	978
HS72	72	1.8	7.1	2.2	2.1	1.6	372	1409
HS84	84	2.1	8.4	2.6	2.9	2.2	649	2458
HS96	96	2.4	9.5	2.9	3.7	2.8	845	3199

Table 1: VortSentry HS Maintenance Indicators and Sediment Storage Capacities.

VortSentry HS Inspection & Maintenance Log

VortSentry HS Model: ______________________ Location: ______________________

Date	Water depth to shipment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the distance given in Table 1, the system should be cleaned out. **Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.